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A consideration of planned production of tomatoes with the available market and technical data as it may be used in teaching planned production in vocational agricultural courses in high school

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A CONSIDERATION OF PLANNED PRODUCTION OF TOMATOES WITH THE AVAILABLE MARKET AND TECHNICAL DATA AS IT MAY BE USED IN TEACHING PLANNED PRODUCTION IN VOCATIONAL AGRICULTURAL COURSES IN HIGH SCHOOL

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INTRODUCTION

EXPLANATION OF PLANNED PRODUCTION

Production is defined as, "That which is yielded by nature or made by man's labor and thought." Economic production is an effort by man to supply something that is needed or wanted by man. In agriculture, planned production is synonymous with economic production, and is suggestive of the vocational term "purposeful activity." Planned production is a broad term, and the planning may be confined to a single crop or include all the products in a farm organization. Planning by commodity groups may extend to all areas competing in a specific market. In this study planned production will be considered in its application to individual annual crops, and planning by commodity groups. It involves determining existing periods of "wantedness" and the utilization of available resources to supply something that is wanted, when it is wanted. Tomato production is selected for study because carlot receipts of tomatoes into New England markets exceed the receipts of any other vegetable except lettuce, and because tomato production in New England is not efficiently planned.

Tomato production may be planned for a single purpose or for a combination of purposes, i.e. -

1. Planning a continuous supply in the home garden.
2. Planning a continuous supply of marketable fruit for

the roadside stand or other retail trade.

3. Planning a supply of early fruit for early wholesale trade.
4. Planning a continuous supply for wholesale trade.
5. Planning for the can-house or other manufactured products.
6. Planning a supply for the pack-house for shipping.
7. Planning a supply for scarcity periods and for making tomato juice during surplus periods, in local markets.

"The economic factors in agricultural production are land, labor, capital and efficient management."[6] The factors of special significance in planning tomato production in New England are first land, and second, efficient management. "Land embodies within itself both in the soil and in the atmosphere certain latent natural forces, classed as chemical, physical and biological, which the farmer is able to utilize in his productive process. Successful production consists in bringing plants into the right sort of relationship with soil elements."[6] Soil selection is an important factor of planned production.

1. Land. A wide range in types of soil in Southern New England greatly increases the problem of efficient utilization. The coastal region consists of sandy loams and miscellaneous stony soils and the climatic conditions are favorable to the production of a large variety of farm products. The agricultural area adjacent to New Haven,

Connecticut, has over a thousand acres in tomato production, the largest acreage of any county in New England and much of the soil used for tomatoes is Wethersfield loam, which is naturally a late soil. Here the growers depend upon favorable climatic conditions for early maturity. Bristol County, Massachusetts, has soil and climate favorable to early crops, and while the acreage in tomatoes is less than a thousand there is evidence of planned production by individual growers and by the commodity group. Individuals grow early July tomatoes on the lighter soils for the nearby market, and the midseason or main crop is grown for packing house shipments to Boston.

The Connecticut Valley region has extremely valuable types of soil and some planned production. Here Hartford County, Connecticut, leads with four hundred and sixty nine acres of tomatoes and Hampden County, Massachusetts, reports one hundred and sixty acres. Many of the valley farms, from Springfield south, since their purchase from the Indians, have remained in strips (lying east and west, so that each farm is a cross section of the area.) Meadows of clay loam, plains of sand and upland pastures and woods on medium sandy loam are found on each farm. The early settlers in this valley had no specific type of farming in view, but selected a variety of soils and surfaces for a variety of productive enterprises. "Over a long period types of farming seem to work out themselves." (6)

Some of these farms show planned production, especially where individuals throughout the years have attempted to use each type of soil for the purpose for which it was best suited. Soil fertility on the sandy plains has been built up by continuous application of manure from animals kept on feed from the meadows, which in turn are kept fertile by annual spring floods. Some of this sandy soil has been cultivated for hundreds of years, yet it is returning more per acre than the heavier so called rich land. Early crops of small fruits and vegetables in this section when properly planned bring high returns, but there remains a drastic need for more careful planning on some farms to promote orderly marketing of annual crops, especially tomatoes, which are now causing annual surpluses in August.

During the fifty years that tobacco was the major crop in this valley some growers "planned" their tobacco production by setting out half of their acreage on special selected sandy soil for early tobacco and the remainder on heavy soil for late tobacco. This plan provided maximum utility of labor and equipment, but above all it provided minimum risk against hail, excessive rain or drought.

Strawberry production, which for years has been planned for early maturity by the utilization of early sites and soils in Hartford County, Connecticut, has

attracted public attention.

Wherever we find planned production it is the result of the efficient utilization of the different types of soil. Authorities agree that sandy soil is best for early production, and it will be shown that New England needs early production of tomatoes and possesses types of soils to produce them.

2. Efficient management as a factor of planned production involves purposeful activity which is so important in efficient planning. It enters into every phase of the production program. Regardless of whether the planning is done by the individual grower or by commodity groups, some form of management must determine how and when to best produce the commodity. "Needless to mention a market for the commodity must exist." New England is an outstanding market for tomatoes. Eight hundred thousand bushels are grown here and over two million bushels are shipped in annually. "The essential element of a market is the possession of accurate information on market conditions and all the activities in meeting them effectively." Professor C.L. Holmes lists the factors of efficient management as follows:-

"a. Understanding of economic laws and forces.

b. Possession of expert technical knowledge and skill.

c. Sound judgment and common sense."

These are also the factors so important in efficiently planning production, because planning the maturity of a crop to meet annual scarcity periods and to avoid annual surplus periods, requires economic vision to determine the periods as well as technical knowledge and skill to effectively meet them. "Economic vision must be considered from this time on as one of the prime requisites of success in American agriculture."

The economic data necessary for determining periods of scarcity and periods of surplus must be collected and computed over a number of years in order to establish the results, and to distinguish the annual seasonal periods from abnormal periods caused by weather, over-planting or under-planting. Extremely high prices on perishable products indicates a scarcity. The Bureau of Markets in nearly every city in New England keeps daily records and publishes reports of supplies and prices on farm products so it is possible to obtain information regarding the volume of any commodity with price levels over a term of years and thus identify annual scarcity or surplus periods.

Individual farmer's records in the areas of production and official reports from the market service in the principal cities of New England over a term of years show conclusively that periods of intense scarcity of fresh tomatoes occur annually throughout July, followed by periods of wasteful surpluses annually in late August.

The annual July scarcity period with attending exorbitant high price levels, higher in New England than in any other section, promotes under-comsumption of fresh tomatoes during that month and increased use of inferior green packed ones. The August surplus period, which annually becomes serious after the middle of the month, results in great waste and severe losses to the growers. While there is some opportunity for widening the uses of tomatoes by making tomato juice during surplus periods, the great need is for more accurate information on market conditions by persons concerned, and to plan production accordingly.

Planned production of tomatoes in New England is thus the actual operation of a productive program planned consistently with prevailing resources of climate and soil, and combined with technical knowledge and skill in the cultural practice to efficiently meet the existing annual scarcity period in July and to avoid adding to the existing annual surplus period in August. Under present market conditions and from observation and experience in the areas of production it is evident that it involves giving over a part of the present acreage to early production, thus stepping up the present volume by the applization of early cultural methods. This would build up the present low volume in July and reduce the volume causing so much waste annually in August. To accomplish

this the factors of "early" land and efficient management must be effectively developed and utilized.

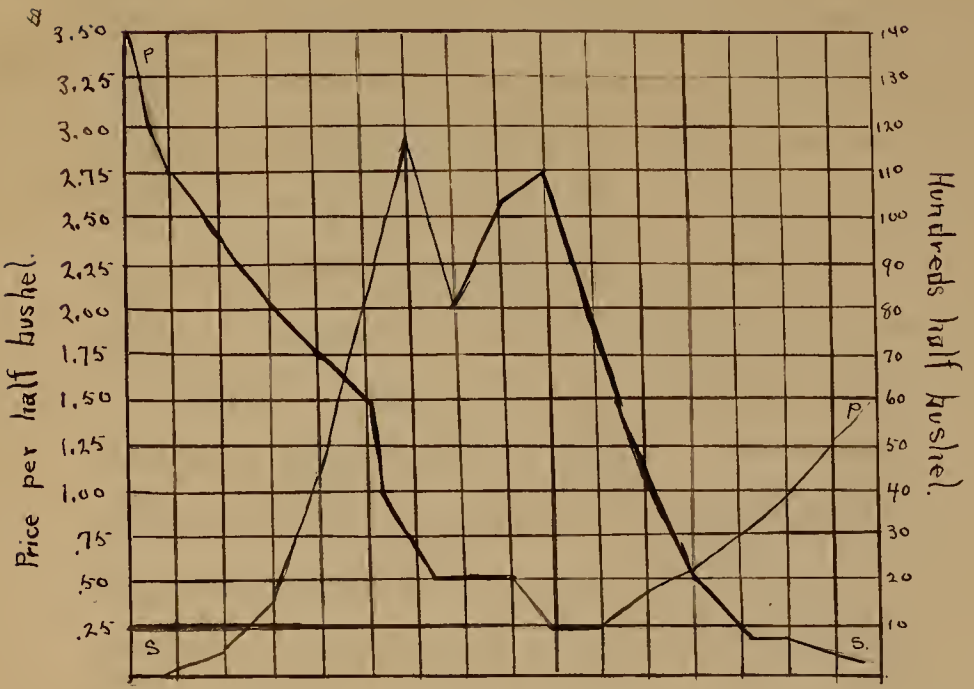
"Strictly speaking we cannot discuss the matter of the capacity or efficiency of land except in terms of its performance in the raising of some specific crop."[6] Land has certain "immovable" properties; one of these is the characteristic of certain sandy soils to promote rapid growth and early maturity of certain plants. Under the present methods of growing tomatoes in New England this valuable property of many sandy soils is being slighted through a lack of technical knowledge and skill in cultural practice. Some growers make the mistake of growing late varieties on sandy land. Authorities agree that sandy soils are best suited for early production (except where the expense of irrigation is justified) and that heavier soil is best suited for late or mid-season production. Tomatoes require an abundant supply of moisture in the plant at fruiting time, but the amount of summer rainfall in New England usually is not sufficient to supply the required moisture for the successful fruiting of late tomatoes on sandy soil. However such soil can be conditioned by efficient manuring to conserve moisture sufficient for the successful fruiting of extremely early tomatoes. When such early soils now in late tomatoes in Southern New England are utilized efficiently for early production July shortage of fresh tomatoes will end.

GRAPH I.

TOMATO WEEKLY SUPPLY AND PRICE VARIATION

HARTFORD FARMER'S MARKET 1934.

(17)



July prices averaged above $2.00 per half bushel, yet over 20 carlots of southern tomatoes were received in July.

Unfavorable weather in August caused a fall in volume with a corresponding check in price decline.

The utilization of more early land, combined with early cultural methods would promote a uniform supply at uniform prices.

JUSTIFICATION FOR STUDYING AND TEACHING PLANNED PRODUCTION

In 1934 over a million bushels of tomatoes were unharvested in this country because of poor market conditions. Thousands of bushels have wasted during August in the fields of Massachusetts,and Connecticut. annually because price levels were below the cost of picking and hauling to market. The August surpluses are not caused by shipments from the South. The city market records show that no such shipments are received in August. (See Table I-A) Neither is this surplus caused by over planted acreage. The intense scarcity shown by market records to exist regularly in July in all New England markets does not indicate over planted acreage. New England's surplus of tomatoes in August and scarcity in July is the result of misdirected production. Reduced acreage of tomatoes does not concern New England but emphatically planned acreage is needed. Planned acreage or the efficient utilization of each type of soil would result in an increased volume of local tomatoes in July and a reduced volume in August.

The volume of local tomatoes naturally increases as the season advances, and it is noticeable that the volume of shipped in tomatoes decreases. In August few tomatoes are received from outside areas, except small shipments the first of the month from Maryland. During the last five years there has been a slow trend to more early tomatoes among New England growers. (See Table

TABLE I. BOSTON MARKET REPORTS

RELATIVE MONTHLY VOLUME OF LOCAL GROWN AND SOUTHERN TOMATOES

A.- As the season advances the volume of local grown tomatoes increases and the volume of shipped in decreases.

1934 Monthly	June	July	Aug.	Sept.	Oct.
Local grown estimated carlots	16	32	327	194	54
Shipped in carlots	458	394	8	23	115

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RELATIVE JULY VOLUME OF LOCAL GROWN AND SOUTHERN TOMATOES

FIVE YEAR PERIOD.

B.- The July volume of local grown increases while the July receipts from outside areas decrease.

Five years July volume	1930	1931	1932	1933	1934
Local grown estimated carlots	14	32	17	15	32
Shipped in carlots	412	408	453	377	394

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RELATIVE AUGUST VOLUME OF LOCAL GROWN AND SOUTHERN

TOMATOES. FIVE YEAR PERIOD.

C.- The August volume of local grown increases and the shipped in decreases.

Five years August volume	1930	1931	1932	1933	1934
Local grown estimated carlots	144	173	285	239	327
Shipped in carlots	177½	83	94	40	8

I-B) As the local supply in July increases the volume of shipped in tomatoes decreases. In 1930 the first receipts in Boston of local grown tomatoes were quoted at $2.50 per half bushel on July 28th and the total July volume of local tomatoes in that market was only 7,000 bushels. The shipped in volume for July was 206,000 bushels, which consisted of 78,000 bushels of ripe-packed fruit from Maryland and 70,000 bushels of green-packed from Tennessee and the balance from distant areas. In 1934 the first receipts in Boston had advanced to July 16th at $2.25 per half bushel and the total July volume of local tomatoes was 16,000 bushels. The shipped in volume for the same period dropped to 197,000 bushels, this cut in volume over previous years being due to a decrease in the receipts of green-packed fruit from Mississippi and Tennessee.

Up to 1934 the principal sources of shipments of tomatoes into New England in July were Tennessee, the Carolinas, Maryland and New Jersey. Tomatoes from the Carolinas and Tennessee are green-packed and never possess fresh tomato qualities, but Maryland and New Jersey offer ripe-packed fruit and they are competing for the New England July market. If New England growers fail to consider the present July demand, New Jersey and Maryland growers with improved highways, rapid truck transportation and improved cultural methods and packing may be

expected to supply this market. New England growers have one distinct advantage in that ripe tomatoes are difficult to ship without damage. it is estimated that not more than half of the volume of ripe tomatoes shipped by truck reach the consumer in a thoroughly sound condition.

(Note; Recognizing a contention that tomatoes cannot mature out doors in July under New England climatic conditions, the records show that it has been done for years. The Boston Quincy Hall Market records show tomatoes selling during the week of July 15th, 1835 at 50¢ per dozen and on July 20th, 1837 "well ripened local tomatoes" selling at 50¢ per peck. In Hartford County, Connecticut, individual growers years ago demonstrated conclusively that picking could start July 1st, but tobacco production came to the front and tomato culture was temporarily abandoned.)

The contention that New England growers may economically produce tomatoes in July is demonstrated by a number of growers who are now producing in July with much profit, but they dislike to encourage others to enter the field because of competition. One of the largest early growers in Connecticut hesitated to submit any information on this subject for this reason. This man's father began marketing tomatoes in Hartford fifty years ago. His soil naturally late, is of Podunk silt loam and to mature

tomatoes early on such land requires great expense in order to render the land capable of early maturity. Underground drainage and special cover crops with deep plowing and special fertilization add greatly to the expense in comparison to fertile sandy soil, which naturally produces early crops. Hartford County is endowed with a vast acreage of fertile sand suitable for early July tomato production at low cost and if early tomato production should become popular among owners of such land, those now producing under expensive methods would be at a disadvantage.

In Hartford Market reports for 1934 local outdoor tomatoes are quoted June 26th at $4.00 per half bushel. If climatic conditions permit ripening of tomatoes in June, then July production is possible.

APPLICATION OF THIS STUDY TO TEACHING.

For any successful and effective application of planning a productive program Professor Holmes lists four great needs of the farmer as follows:-

"1. A technical knowledge of the factor requirements of the commodity.

2. The basis for a fairly accurate forecast of the purely physical results, that is the amount and kind of product which he may expect from the various alternative uses of his resources.

3. He needs a well grounded forecast, either on his own part or on the part of some price expert of the prices which may be expected.

4. Finally he needs to put the projected program in definite form in what may be called a farm budget in order that he may have a definite guide for his operations."

This program is the basis of the project method of teaching crop production. It is a direct guide to teaching planned production. "It is forward looking and dynamic."[6] It is equally adaptable for teaching beginners or advanced pupils. "Motivated by economics they will seek maximum utilization of resources."[6]

Vocational agricultural courses under the project method of teaching emphasize and promote economic production, to the extent that practical contact is made

with all the factors of production. Crop planning, budget estimating, record keeping, making reports and carrying financial responsibility constitute an important phase of the pupil's productive program. Land, labor, capital and efficient management are each given due consideration, yet the efficient utilization of land, labor and capital is so dependent upon economic conditions that pupils must in addition to technical knowledge and skill know how to determine the best time to produce the commodity, to insure against financial loss.

The problem in teaching is to provide direction for the pupil to gain the needed information. The teacher must demonstrate that the information is necessary, but should advise only with presentation of available facts in support of a plan. If the market reports show a surplus or scarcity period pupils should be taught to find these facts from available sources, that they may make the proper use of data available at present, and learn to make use of that available later on.

Knowledge necessary for planning production may be obtained from several sources. Farmers with experience in the markets know the best time to produce annual crops. Some take advantage of the lack of planning by the rank and file growers and plan their production to avoid such misdirected production, others practice what

has been tested and handed down by previous generations. Pupils must get this information. Planning by commodity groups to supply packing houses, canning houses or for other manufactured products is a common type of planned production, but such planning is simple as compared to planning to meet scarcity and to avoid surpluses.

All agricultural marketing agencies recognize the growing necessity for more uniform volume in the marketing of perishable farm products. Professor Black states that, "Stabilization of planting will do much to reduce surpluses but the problem will still remain as the outstanding problem for public agencies to solve." Stabilization of planting refers to stabilized annual acreage and prevents only those surpluses caused by over planted acreage. New England has no general over-planted acreage of tomatoes. The problem to solve here is how to increase the July volume and prevent waste in August. If the agencies could direct the growers regarding the adjustments in volume needed to stabilize the supply to the extent of available resources the growers could attempt to make adjustments. The grower in addition to technical knowledge and skill needs to know the economic aspect or the market reaction to demand and supply, and the public agencies need to recognize and understand the technical problems pertaining to the utilization of the resources available in the productive

area. Cooperation between public agencies and the grower will then be possible and will provide the coordination necessary in planning annual production of tomatoes efficiently.

Market reporters keep records and publish practical data on market conditions, county agents assist the farmer on crops, soils and various manipulation of the resources of the county, the extension service promotes economic and technical efficiency and agricultural instructors attempt to promote modern methods. These agencies have been active for years yet New England produce markets continue to encounter annual surpluses and unnecessary scarcity periods. These undesirable market periods are being ignored to the serious disadvantage of producer and consumer. Consumers will suffer from scarcity periods and growers will suffer losses from surplus periods until there is coordination among all concerned in recognizing the problem and in attempting to solve it. "The most formidable problems do not arise from limitations in the ability of man to command the resources of nature. They arise from imperfect coordination of human effort." (H.Sibley)

Market records, farmer's records and experience in the markets and on the farms all indicate that the first step in the problem of efficiently planning the local tomato crop is to promote early production. This should be emphasized in teaching.

UNPLANNED OR MISDIRECTED PRODUCTION IN NEW ENGLAND

The most astounding example of unplanned production was presented by the Connecticut Valley tobacco growers. Tobacco is neither a food crop nor a perishable product but the case has an important bearing on misdirected production. High price levels following the war promoted over planting on poorly selected soil by new and inexperienced growers. Buyers "who knew the market" hesitated to buy; cooperative warehouses were built and continued to encourage vast surpluses of inferior tobacco in spite of failing markets. The productive programs and the selling organization failed to recognize market conditions. This combined with the reduced consumption of cigar tobacco brought temporary ruin to all growers.

Tomato production in Southern New England is confined to less than six thousand acres with three thousand acres in Massachusetts, two thousand acres in Connecticut and five hundred acres in Rhode Island. Yet with this small acreage serious surpluses occur annually in late August and intense scarcity annually in July, which indicates misdirected production of tomatoes in New England. (See Table II.)

TABLE II.

MONTHLY PERCENTAGE OF TOTAL ANNUAL VOLUME, LOCAL GROWN TOMATOES IN FIVE NEW ENGLAND PRODUCE MARKETS.

City	July	August	September	October
Boston	5.4%	53 %	30.4%	9 %
Springfield	4	50.5	40.5	5
Providence	10	55	30	5
Hartford	12.5	52	34	1.5
New Haven	3	56.8	39	1.2

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AVERAGE JULY PRICES FOR TOMATOES IN NEW ENGLAND WHOLESALE MARKETS - Half Bushels.

Year -	1931	1932	1933	1934	1935
Boston	$2 50	$2 00	$2 25	$2 00	$2 00
Springfield	2 50	2 40	2 25	2 25	2 12
Providence	2 25	2 20	2 00	1 90	1 60
Hartford	2 50	2 25	2 25	2 20	2 10
New Haven	2 25	2 25	2 25	2 00	2 00

The average range is $3.25 July 1st to $1.75 July 31st.

"High price levels for a commodity over a period of years during a given period, denote a well defined period of scarcity."

- -

AVERAGE AUGUST PRICES FOR TOMATOES IN NEW ENGLAND WHOLESALE MARKETS - Half Bushels.

Year -	1931	1932	1933	1934	1935
Boston	50¢	50¢	38¢	50¢	40¢
Springfield	50	50	50	50	40
Providence	60	50	60	60	35
Hartford	40	35	35	40	35
New Haven	45	38	35	30	35

The average range is $1.75 Aug.1st to 20¢ Aug. 31st.

When low prices prevail surplus periods are indicated.

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Note:- Percentages and averages obtained from weekly prices and volume reported by Bureau of Markets.

"Well defined seasonal changes in price levels are of interest to the farmer in timing his production so as to be able to sell at the most favorable period." During July in the New England produce markets the price for local grown tomatoes ranges from $3.00 per half bushel on the first to $1.75 on the thirty-first. These prices have prevailed in spite of a volume of 200,000 bushels of shipped in tomatoes during July. On August 26, 1935, with no southern tomatoes in the markets the price for local tomatoes in New Haven, Providence and Springfield dropped to 25¢ per half bushel.

Climatic conditions are usually accepted as the cause of August surpluses in New England, but, "Too often there is very little planning preliminary to starting the crop and the productive organization is a haphazard development determined more by chance than by consideration of the economic issues involved and a careful working out of the problems as they appear. It is the common opinion that the farmer makes a serious mistake by marketing his produce at any time without considering price conditions which prevail at marketing time. The dumping of large quantities of produce within a short period inevitably has a depressing effect on the market, which might be avoided and it would profit the farmer to spread the sale of his products over a longer period, commensurate with periods of consumptive demand for the

product."[6] In New England a normally short growing season promotes the maturing of the greater proportion of tomatoes in August. Farmers using sandy soil and early cultural methods are producing tomatoes in July. This spreads the sale of tomatoes commensurate with periods of consumer demand. There is evidence that tomatoes can be produced in greater volume in early July in Southern New England. A body of technical knowledge accumulated in over a hundred years of commercial tomato growing in New England is available. A survey of soil types and cultural methods in the areas of production indicates a serious lag at present in the prevailing method of growing tomatoes. There is a general failure to utilize the available resources for early production.

The need for planned production has been stressed by authorities who are familiar with New England agriculture, i.e., 1. Professor A.M. Porter, Connecticut State College; "The most profitable tomatoes grown in New England are those ripening before August 14th."

2. Raymond E. Iles, Reporter, Springfield Market; "It is evident that local growers are not supplying their share of vegetables consumed locally. Some farmers are greatly increasing annual income by attempting more early maturity of tomatoes."

3. A.W. Gilbert, former Commissioner of Agriculture in Massachusetts; "Farmers must find their place in the

production of commodities consumed locally and act immediately to supply local products to the extent of available resources before growers in other areas of production take over the local market."

4. W. A. Munson, Director of Extension Service in Massachusetts, in a contribution to the agricultural press in 1926 emphasized the great need for orderly production in New England agriculture.

5. At the annual meeting of the Vegetable Growers of America, in 1935, the serious annual surpluses in New England markets was the foremost subject of discussion by the New England delegates. Charles D. Lewis, Agent on Government Crop Control, speaking on Crop Adjustment, said; "Are we and our descendants to go through the years buying seed, fertilizer and spray material, carrying heavy mortgages on farms and equipment, paying taxes, and working ourselves and our families to produce crops that are not sufficiently wanted to pay the cost of transporting them to market ? Is there anything sacred or patriotic about the production of great unwanted surpluses of agricultural commodities ? The greatest evil in the vegetable industry today is the needless 'glut' that occurs on the markets every year."

A well known college professor recently questioned the policy of the government, in using tax money to pay farmers for crop reduction, while at the same time

supporting agricultural agencies that promote production and the attending surpluses. This reference challenges public agencies to emphasize and promote only planned production. Production must be promoted as long as periods of scarcity and under consumption exist. Efficiency agencies do not promote surpluses. If the present annual volume of local tomatoes could be spread over July, August and September there would be no surplus.

A personal canvas of twenty farms each raising one or two acres of tomatoes in the Connecticut valley region in August 1934 disclosed that seven tomato growers were planning the erection of small hothouses for the purpose of starting early plants. Each of the seven were emphatic in their decision that early tomatoes were wanted and that one sure way of getting early tomatoes was to grow their own plants and develop them for earliness. This was their first step toward a planned production of tomatoes. In August 1935, five of these hothouses had been erected and used successfully for early plants and each grower reported increased receipts through early production of his tomatoes, although price levels in 1935 were lower than in 1934. Of the fifteen growers who made no attempt to step up early maturity of their tomatoes six reported a loss for 1935 and insisted that tomatoes were a hopeless crop, and

two of them are dropping tomatoes from their productive program. Among those erecting hothouses two were former members of a high school vocational agricultural course, where the instructor had attempted to teach early production of tomatoes. These boys followed instructions for early maturity. They started the plants early, maintained a steady healthy growth, prepared the land in advance, supplied phosphorus early with manure in addition to 5-8-7 commercial fertilizer and plowed early. The crop matured the middle of July and they received $2.00 per half bushel for a large proportion of their yield. Their acreage will be increased in 1936.

It is not the purpose of this study to advocate increased acreage in New England, but why must the acreage remain low when New Jersey growers raise over 30,000 acres with less surplus. A part of New Jersey's crop is grown to meet New England scarcity periods. In the five principal New England market centers a total of over 200,000 bushels are shipped in during July, over half of which are inferior green packed fruit, which would be displaced by consumer-choice if local growers would produce in July.

CASES OF PLANNED PRODUCTION.

In New England agricultural history, there are many individual cases of planned production where success has been the result of skillful technicans recognizing the economic aspects of their business. In 1887, Hale Brothers, by careful selection of sites and soils and with corresponding carefulness in selection of varieties presented an outstanding example of planned production of peaches in Connecticut. These men did not harvest their vast crop at one short period to load the market, but instead maintained a continuous, uniform supply during August and September. Mr. J. H. Hale recognised further local scarcity periods and the possibilities of meeting them. In 1895 he had developed, with his technical skill and economic vision, large Georgia orchards to supply northern markets during June and July. The result was a continuous and uniform supply of Hale's peaches throughout June, July, August and September, the longest period possible consistent with the resources at hand. This system of planned production was highly successful for fifteen years, then others North and South hastened into peach production and Mr. Hale, foreseeing the future chaos that would result from such unplanned production sold his Georgia peach orchards and gave his attention to a planned production of apples in Connecticut. Mr. Hale's apple enterprise was planned on a

basis of using city storage plants for storage. He started two large apple orchards, one near New Haven and the other near Hartford, where adequate cold storage was available. When these orchards came into bearing the marketing was extended over a period commensurate with the consumptive demand. While Mr. Hale was very careful to plan his production of both apples and peaches, ultimately in each adventure he was confronted with competition from growers who neglected to plan their production in accordance with the simple laws of supply and demand. "It is impossible to have a balanced stabilized production under a voluntary altruistic system, because there are thousands of individual producers scattered over a large area. The necessary stability can be attained only through a contractual arrangement of some kind." A contractual arrangement in perennial crops, especially apples and peaches, is difficult. Such long term planning is subject to the risks of obscure future changes.

Stabilized production of annual crops can be maintained from year to year, (subject to weather conditions.) Commodity groups must be guided by some specific demand and standard types of production must be developed to meet demands of local market, packing-house, canning-house, or other special demand. New Jersey growers through the experiment station, have developed two types

of production each to meet a specific demand. Nearly ten thousand acres are grown on sandy soil for early local markets and to ship to northern markets. Twenty-two thousand acres are grown on medium loam to produce maximum tonnage for canning houses, which open in August.

County planning in New York State consists of planning production by commodity groups and by individual farmers. In each county a Planning Board represents every agricultural interest in the county. Pomona Grange, Farm Bureau, Farmers' Exchange, dairymen, poultrymen, fruit and vegetable growers, and the State Agricultural College, are all represented on this Committee for assembling information in the county. The object is to promote the best use of the various agricultural resources of each county. In Chautauqua County a publication, "Planning Ahead," contains a digest of findings of the committee in that county, which represents the best thought of a group of men who have a thorough understanding of agricultural conditions. The information is made available to farmers that they will be in a better position to judge for themselves as to what changes may be desirable. Each agricultural commodity grown commercially in the county or that has possibilities is taken separately and all facts related to the production and marketing are reviewed under, -

Situation. Then on the basis of the situation, adjustments and recommendations are given in detail. In Chautauqua County the changing conditions in agriculture are being met. Agricultural instructors in the county are using this material in teaching. Mr. Charles O. Flagg, Agricultural Instructor at Westfield (New York) High School, says, "It is a great help in teaching pupils to plan crop production." It provides a definite program, and a reason for developing economic vision, as well as technical knowledge and skill.

County agents and extension specialists aid in planning production. Egg production to meet high price periods is receiving attention. In Ohio, an investigation of the poultry activities on some farms reveals the influence which early laying pullets exert on profits, which in turn suggests possible improvement in more uniform productivity the year 'round. The farmers in the Ohio survey were divided into two groups. One group so managed their flocks that of the total yearly egg production 25% was marketed during October, November, December and January, the period of normal scarcity. In these flocks the pullets came into production early and because of high prices for this 25% of their annual production the eggs averaged 38¢ per dozen for the twelve months. The other group did not develop early layers,

selling but 4% of the year's total in the October to January period, and they averaged only 30¢ per dozen for the twelve months, which illustrates the importance of proper distribution of production. The Massachusetts Extension Service is at present recommending a program for local poultrymen to promote a more uniform supply of eggs. This consists of hatching baby chicks out of season and holding hens for 15 months of laying, which "levels off" production and takes advantage of a 14¢ spread between spring and fall egg prices.

Dairymen are regulating periods of freshening to avoid June surpluses, and are improving the methods of summer feeding to avoid late summer shortage of milk.

The entire program in planning production involves changes to meet changing market conditions. Since individuals are slow to make changes there is a need for all agricultural agencies to stress the importance of timely production.

NATURAL AND LOGICAL SOURCES OF INFORMATION ON PLANNING.

The natural and logical sources of information on planning are in the markets and on the farms. Knowing market conditions and the resources in the local areas of production are necessary for planning technical knowledge and skill are then necessary to carry out plans. Participation is more valuable than mere observation, in either the market or on the farm. The most successful tomato growers are expert market men, as well as experts in growing. Experience in marketing should provide information on the favorable demand periods, trends in consumer demand and condition back of these trends, methods of packing and methods of transportation. An important part of marketing is the formulation of plans for the next season.

Marketing experience promotes a realization of the importance of planning ahead. The dull market days with slow sales, low prices, and the accumulation of a large volume of unwanted perishable products are problems that demand study and future adjustment. The brisk market days with high prices, low volume and the accumulation of unfilled orders also demand study and adjustment. Experienced growers adjust their productive program as their experience in the market dictates from year to year, and they discriminate between abnormal conditions and "real" conditions. That experience

in marketing is important guidance for planning production has been demonstrated recently by the achievements of two outstanding market men and farmers of Hartford County, Connecticut. Mr. J.R. Pilgard and Mr. C.N. Dodge each started out in life clerking in meat and vegetable markets. Later each became a proprietor of a large market and each acquired a large farm. The production on each farm was planned to supply a uniform volume of selected commodities for their retail store trade. Contact with a great number of consumers had given these men valuable information on the demand for local products. They recognized annual periods of scarcity for certain local products and attempted to meet them. They produced vegetables and fruits when they were in demand and a uniform supply of eggs and milk throughout the year. Each built up a remarkable business in store trade and on the farm.

A similar type of planned production is that of supplying commodities for the roadside stand. There are two classes of roadside stands conducted by farmers. One is conducted to dispose of miscellaneous commodities produced, while the other is conducted for the purpose of supplying a uniform consumer demand and the production is planned accordingly. The fact that the retail price levels do not drop so suddenly in surplus periods as the wholesale prices, allows some commodities to be sold

profitably at the stand during serious surplus periods. In August when the wholesale markets are usually glutted, farmers with roadside stands dispose of a remarkable volume of tomatoes. On August 25th, 1935, stands in New Jersey and Connecticut were selling at 35¢ to 50¢ per half bushel when the wholesale price was 25¢. While the roadside stand gives information on consumer demand it is not an accurate or dependable indicator of the actual market conditions, for a given area.

In commercial tomato growing the highest return consistent with available resources and costs of production is the motive for planning. The highest net returns are dependent on the ability of selling a high percentage of the volume during high priced periods, and keeping the costs of production as low as possible. One learns in the markets what and when to produce.

In the market one may acquire the facts to establish the objectives of his productive program, i.e. -

1.- Daily prices and conditions effecting them.
2.- Existing periods of scarcity of local produce, and of surplus, and the causes of such periods.
3.- Existing standards in quality.
4.- The free choice of consumers as indicated by prices.
5.- How other growers are meeting market conditions.
6.- Needed changes in one's own productive program to

meet market requirements.

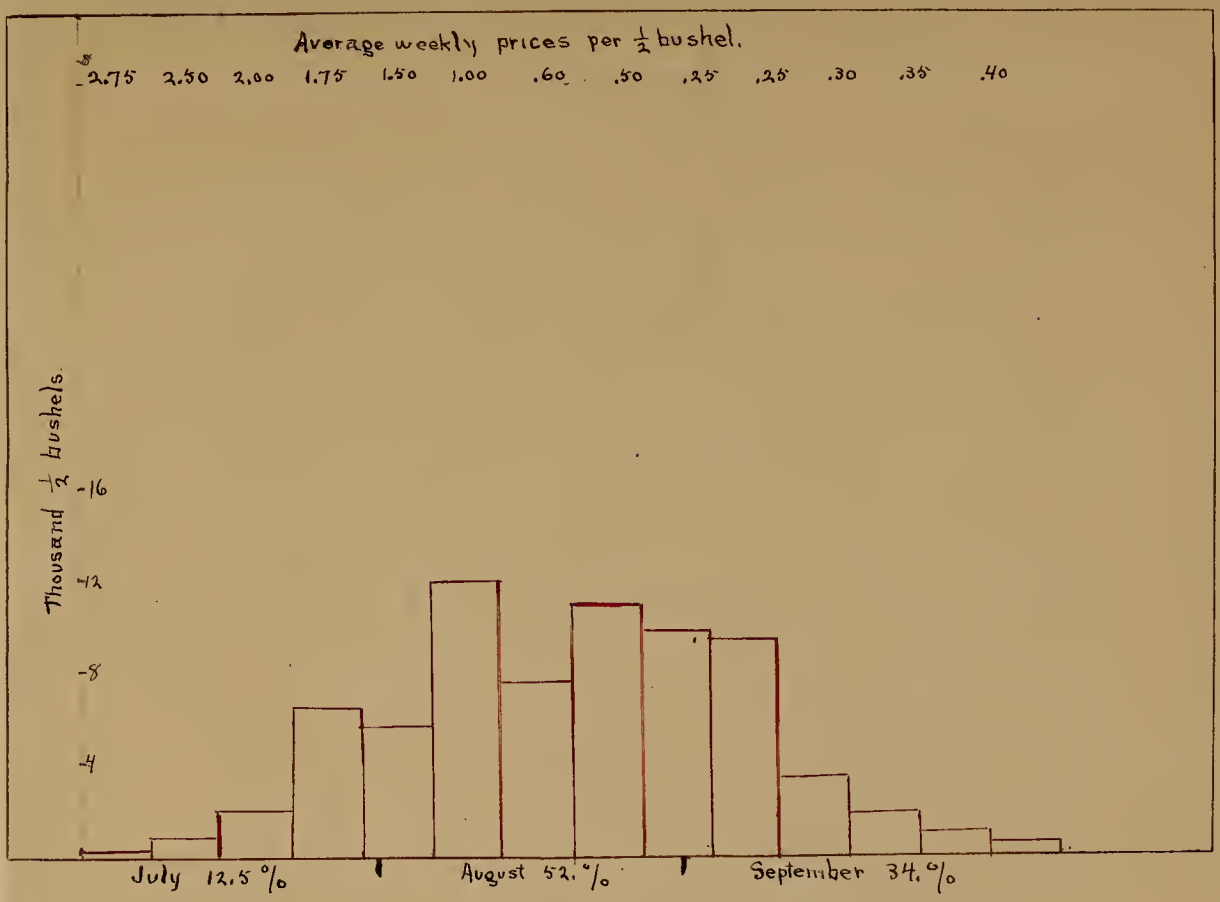
Information on these items effectively applied with technical knowledge and skill in the productive program will improve the tomato industry of New England.

Experience and observation in the areas of production provide some information on the market conditions. Successful commercial growers of tomatoes plan their production for a purpose or for their own convenience at least in the utilization of land, labor and capital. The purpose of such planning is usually evident or can be acquired from them. However, the outstanding item of information that may be acquired from successful growers regarding market conditions is that such growers attempt to harvest a part of their crop in July. Mr. John W. Shirley of Lawrence, Massachusetts, starts marketing July 18th and Mr. Anthony Christensen of Wilson, Connecticut, starts July 16th. Both are large growers and they attempt to harvest a part of their crop during high price periods. They do not possess light soil but employ special cultural methods to promote early maturity so far as possible on heavy soil.

According to market reports New Haven County, Connecticut, growers harvest 3% of their annual volume in July at high price levels and 95% in August and September at low prices, while in Hartford County 12.5% of the annual volume is marketed in July with 86% in August and September.

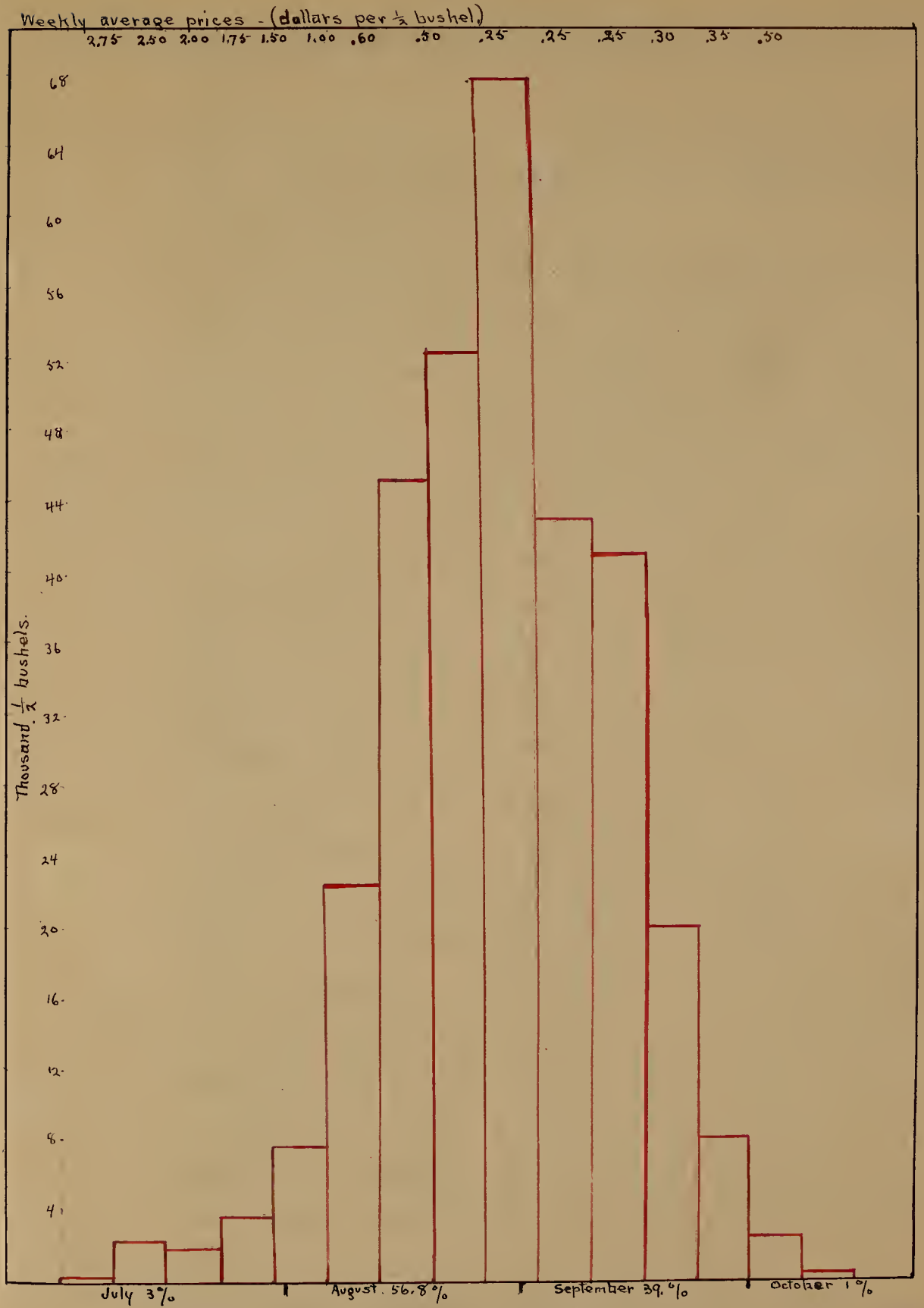
CHART I.

WEEKLY VOLUME IN HARTFORD FARMER'S MARKET 1934
LOCAL TOMATOES. (17)



12.50% of total volume in July - Highest volume at $1.00 per basket. Hartford shows 9.50% more volume during the high price period in July than New Haven with a corresponding reduction in volume during the low price period in August and September. During 1934 in the Hartford area, several farmers specialized in early tomatoes on fertile sandy loam previously used for tobacco.

CHART II.
WEEKLY VOLUME IN NEW HAVEN FARMER'S MARKET (1934)
LOCAL TOMATOES. (17)



3% of annual volume in July with highest volume at 25¢ per basket.

A comparison of the two areas shows one striking difference - the largest proportion of the New Haven County tomato acreage is loam and miscellaneous stony soils, while in Hartford County fertile sandy soils are used to a greater extent.

The Providence, Rhode Island, produce markets report native tomatoes marketed the first week of July. These are grown on selected sandy soils in Bristol County, Massachusetts. Tomatoes have been grown on sandy soil on one farm in Connecticut for fifty years and picking has consistently started July 1st.

Few home gardeners recognize the fluctuating values in the commodities they raise. They do not feel the pulse of the market. In the home garden projects conducted by vocational agricultural pupils it is difficult for such pupils to comprehend that July tomatoes even for the home table must be given a higher value in their income reports than tomatoes produced in August. Growing tomatoes locally in the home garden requires some planning if a uniform supply throughout the season is expected. If the plants are late and if the variety and the soil is not properly selected a very small proportion of the fruit will mature before the fall frosts. The use of sandy land for early tomatoes and of sandy loam for midseason tomatoes promotes a supply from July 1st to frost time. The average home garden produces but few

tomatoes in July. A survey of twenty home gardens in the Connecticut valley in 1934 showed only four producing a supply for the table on July 25th. These were grown on fertile sandy soil.

The beginner may learn how to plan production by following the example of a successful grower or by "starting in" for himself on a small scale. If he works for a grower he may learn the value of properly planned production and the disadvantages of misdirected production. He will know prices received daily and be in a position to observe conditions which meet high price levels. By starting out as a grower and assuming risks the problem of learning market conditions and the successful utilization of available resources will be more keenly felt and studied.

The farm as a source of information on planning production, provides a means of learning, i.e. -

1.- The local practice in producing.
2;- The local resources of climate and soil.
3.- How efficient growers utilize resources.
4.- The relative cost and return of early and late production.
5.- The factors of early production and the application locally.
6.- The importance of planning ahead.
7.- The importance of available facts on market conditions.

TABLE III. INFORMATION FOR PLANNING

RELATIVE RESULTS IN EARLY MATURITY FROM FACTORS APPLIED.

Local Surveys.

Hampden County, Massachusetts.

Name	Acres	Soil	Variety	(Pot-) (ted)	(Train) (ed)	(Pro-) (per) (N.P.K)	(1st) (Pick-) (ing.)
Kasner	1	silt l'm	John Baer	Yes	Yes	Yes	7/20
Christopher	1	sand "	B. Best	No	No	No	7/16
Fini	4	" "	Pritchard	Yes	Yes	No	7/10
Johnson	2	med. "	B. Best	Yes	Yes	Yes	7/20
Kane	2	sand "	Pritchard	Yes	No	Yes	7/15
Porter	1	" "	Penn State	No	No	Yes	7/20
D.Cesan	1	" "	Pritchard	No	No	No	7/15
J.Cesan	2	med. "	Marglobe	No	No	No	7/25
Zola	½	sand "	Pritchard	Yes	Yes	Yes	7/10
Chriscola	2	" "	Earlianna	No	No	No	7/20
Harris	½	Fine s'd	Pritchard	Yes	Yes	Yes	7/15
Morris	1	sand l'm	Marglobe	No	No	No	7/25

Hartford County, Connecticut.

Name	Acres	Soil	Variety				
Christensen	15	silt l'm	Marglobe	Yes	Yes	Yes	7/16
Gavener	4	med. "	Pritchard	Yes	Yes	No	7/20
Lassen	1	sand "	Earlianna	Yes	No	No	7/10
Pollard	2	med "	B. Best	No	No	No	7/25
Cannon	1	" "	B. Best	Yes	No	Yes	7/15
Moseley	1	sand "	Pritchard	Yes	Yes	Yes	7/4
Garrier	1	" "	John Baer	Yes	No	No	7/25
Libera	2	" "	Earlianna	Yes	No	No	6/20
Farnham	4	med. "	Pritchard	Yes	Yes	Yes	7/15
Cooley	5	sand "	Earlianna	Yes	No	Yes	7/1
Zola	2	hvy "	Stone	No	No	No	8/20
Williams	1	sand "	B. Best	No	No	Yes	7/20

Sandy soil, early varieties, potted plants, and proper use of N.P.K. = Early maturity

Sandy soil without these factors does not = Early maturity

Medium loam with these factors = Midseason

In the areas of production outside of New England, New Jersey offers an example of readjusting tomato production to meet changing market conditions. Prior to 1927 eastern United States roughly was divided into three tomato growing sections, early, intermediate and late. The early section included Florida, Georgia, Texas and Mississippi and the product for the northern markets was green packed, out of season in the North and offered no competition to Jersey tomatoes. The intermediate section, of which New Jersey was a part, included Ohio and Tennessee but of these New Jersey alone shipped ripe packed fruit. The late growing section was made up of Delaware, Maryland, Indiana and New York. Maryland growers changed over their farming methods about 1930 and developed into the intermediate class, producing ripe packed tomatoes in competition with the New Jersey market crop. This competition caused the New Jersey Experiment Station to promote new and earlier production methods in that state. Having the advantage of sandy soil they recommended a low cost method of producing early tomato plants known as the blocking system, which consists of starting early plants in hotbeds and transplanting four inches apart in frames. While the plants are developing a soil cutter is applied each week lengthwise and across the beds between the rows of plants. When the plants are set out each block contains a mass of soil

and fibrous roots, which remain intact and the plants do not wilt during transplanting operations in the field. Packing now starts in June and the New Jersey early tomatoes are shipped largely by truck to New York and into New England, much earlier than under the old system. The remainder of the New Jersey acreage is planned for can-house use, and these tomatoes mature later on medium loam. The Experiment Station has developed a new can-house variety (Rutgers) which yields maximum color, flavor and tonnage for canning.

New Jersey's system recognized that sandy soils are best for economic early production and that the heavier loams are best for late production. Soil surveys in Massachusetts, Rhode Island and Connecticut, show a large proportion of sandy soils which are adapted for growing early tomatoes but they are not used for tomatoes. (Map II - Page 65)

In 1934 the total volume of local grown tomatoes reported in the market centers of Southern New England for July equalled 70 carlots, while the volume of shipped in tomatoes for the same period exceeded 500 carlots. Half of this volume of shipped in tomatoes consisted of ripe packed fruit from Maryland, Delaware and New Jersey (50% of which it is estimated reaches the consumer in sound condition.) The other receipts were inferior green packed tomatoes from Tennessee and other

distant places.

The July volume from distant sections is decreasing annually in the Boston market, but the July volume from Maryland and New Jersey is increasing. There is also an increase in volume of local grown in July, which shows the trend in demand for fresh tomatoes.

RIPE PACKED TOMATOES FROM MARYLAND AND NEW JERSEY TEND TO DISPLACE DISTANT SHIPMENTS IN JULY. BOSTON MARKET SOURCES.

July volume		1930	1931	1932	1933	1934	
Maryland	carlots	136	116	129	117	170	) Increase
New Jersey	"	5	10	12	14	13	)
Mississippi	"	42	37	0	20	6	)
Tennessee	"	139	119	0	103	120	) Decrease
Local grown	"	14	32	17	15	32	

Maryland and New Jersey are now shipping to Southern New England markets by rapid truck transportation. In July 1935, truck loads of tomatoes and melons reached many New England markets twenty-four hours after the fruit was picked on the farms of Maryland and New Jersey. There are no actual figures available to determine the volume of tomatoes shipped by truck into New England. Mr. J. M. Fenton at the New Jersey Experiment Station, reported that in 1926 one half of Jersey's market crop was shipped by truck.

U.S.D.A. Year Book - 1935.

Rail shipments only out of New Jersey

1926 - - - - - - - - - -	2,006	carloads
1929 - - - - - - - - - -	692	"
1931 - - - - - - - - - -	52	"
1934 - - - - - - - - - -	5	"

With no decrease in New Jersey acreage this indirectly indicates the extent of increased shipments by truck out of that state.

In spite of the increasing July volume of New Jersey tomatoes in New England markets local grown tomatoes still command a favorable wholesale price, which is double that of the Jersey product.

WHOLESALE PRICES LOCAL GROWN AND SOUTHERN TOMATOES

BOSTON MARKETING SERVICE - July 16, 1934.

Local Grown	(½-bushel @ $2 00)	$2 00 ½-bu.
Maryland and New Jersey	(20 qt.crt. $1 25)	1 00 "
Tennessee green packed	(20 qt.crt. 65)	50 "

Therefore as long as such difference in price levels in the early season exist between local and shipped-in tomatoes local growers have reason to adjust their productive program by shifting from late to early production.

PROCEDURE.

In attempting to show the importance and practical uses of some of the available market and farm data in teaching planned production of tomatoes it must be understood that such material is suggested for the use of pupils fourteen years of age or over, learning to produce in Vocational Agricultural Courses in High School. The planning is strictly by individuals to properly time production.

The traditional method of learning to farm was by farming under the supervision of the father or the employer. This method was effective in crop producing so far as the master was equipped with recognized technical knowledge and skill in producing a specific crop, provided the apprentice was attentive in acquiring the same. "In many cases this method was faulty, because the science was ignored or erroneous." Today authority on the production of most crops is well established, yet the recognition of such authority among farmers in general is not evident; which fact reverts to some faults of the text book method of learning to farm. With the introduction of formal agricultural education the tendency to follow the text book methods used in other subjects prevailed and in most cases prior to 1910 the teaching of crop production

consisted of assignments in text books to learn about the production. Some Agricultural Colleges failed to use experience in production as the approach for acquiring the technical knowledge and skill. Often such learning was not effective in later practice, and consequently some farmers scoffed at text book authority.

The apprentice method of learning is granted great merit by eminent authority, and likewise the solving of problems by reference to text books and other recognized authority is highly commended. Both methods are used in vocational agricultural training, which incorporates the effective phases of the apprentice method and promotes a constant reference to and respect for recognized authority. Here experience is the beginning of the learning.

Vocational courses promote planned production because such training is based on a definite vocational requirement, that pupils learn crop production by producing, "Real products under real conditions." "Real products" meet a demand. Cases with the economic and technical facts for teaching "Real production" can be presented in a form to meet the vocational requirement.

TECHNICAL KNOWLEDGE FOR PLANNED PRODUCTION OF TOMATOES.

Technique involves finding out which way is best. The aids for developing technique are:-

1.- Traditional methods; these have been tried out and if the processes survive they have value.

2.- Master farmer methods; these are valuable aids provided the facts are established.

3.- Government aid through farm bulletins and the farm press. Many of the experimental reports printed in bulletins and the farm press base results of tests on total annual volume only, with no accounting for time of maturity. The fertilizer manufacturers often make claims for superior brands on the total annual volume. Tomato growers attempting to produce tomatoes in July are more concerned about results that show the proportion of the annual volume that can be matured in the early season.

I. CASES - for use in teaching.

INDIVIDUALLY PLANNED PRODUCTION OF TOMATOES IN NEW ENGLAND.

Professor A. M. Porter, Connecticut State College, writes, "The most profitable tomatoes grown in New England are those ripening fruit before August 14th." His plan to meet these conditions is as follows:- Seed of a selected strain, Earlianna, Pritchard or similar varieties, is planted eight weeks before field setting and transplanted into four inch containers when the first leaf appears on the seedling. The plants are grown rapidly and transplanted into the field in tender condition. 1,000 pounds of superphosphate and 200 pounds of muriate of potash per acre are harrowed in the day before setting. Plants are set out on well drained sandy loam May 10th to 20th and staked. 200 pounds nitrate soda is applied as a side dressing after the third cluster is formed. This method produces earlier marketable fruit than any other method tried.

Mr. August Kasner, Agawam, Massachusetts, offers an example of planned tomato production, combining hothouse tomatoes with an outdoor crop. The hothouse crop is not large. Two houses 16' x 30' are used for a late fall and a spring crop. Seeds for the fall crop are started in June; plants are set in the house the last of July, blossoms set before the short days of November and fruit

ripens in December. The seeds are started in January for the spring crop to mature in May. Such production is effectively timed. For the outdoor crop Mr. Kasner follows the precise plan recommended by Professor Porter, except that he starts the seed March 10th, uses the John Baer variety, pricks off into flats and transplants into four inch pots at the proper time. Fine sandy loam is selected and a heavy sod of Italian rye grass is turned under during the summer previous to using for tomatoes. The vines are trained and topped above the fourth fruit clusters. All late production is avoided and Mr. Kasner harvests his tomatoes July 10th to August 20th as planned.

A different method of tomato production is presented on the Moseley farm in Glastonbury, Connecticut, where tomatoes are annually harvested in July. Here seeds are started February 15th in the house, plants are pricked off into flats and placed in hotbeds by March 10th. The plants develop by an unchecked growth and about April 10th are ready for potting. At this time the center bud is "nipped" to produce two main stems and the plants are transplanted into four inch pots. The potted plants are placed in hotbeds. Changes in temperature or in moisture conditions are carefully avoided. About May 1st as the plants develop additional cold frame space is provided and the pots from alternate rows are taken up

and replaced in rows two inches apart in new beds, which provides more light for developing sturdy plants. No haste is made in getting the plants in the field; the sturdy double stemmed plants with two crown blossom clusters can be set out with a minimum check in growth between May 20th and 30th. The fertile sandy loam manured annually for many years previous receives 600 pounds of 4-12-4 fertilizer (available N.P.K.)in the drill, following a bare fallow of several weeks before transplanting. The plants are set low in the soil. The double stalked vines, of the variety Pritchard are staked, trained, pruned and topped above the fourth fruit cluster and are harvested from July 1st to August 15th.

The economic and technical data used by the grower in each case given, consisted of individual market and farm records, which showed the best period for marketing tomatoes and the most successful methods of culture to meet that period. Each grower after long experience in the markets was informed on favorable marketing periods. Each Grower made use of technical knowledge and skill acquired in growing tomatoes, and the methods employed were based on facts which had been tested and proved effective by experts. Such cases are a source of information for learning "real" production.

INTRODUCTION TO EXERCISES FOR TEACHING PLANNED PRODUCTION OF TOMATOES.

At Agawam High School during the past seven years ninty per cent of the pupils entering in September have had some experience in raising tomatoes, or experience in marketing, either buying or selling. (Such experience is requested at the time of application in June.)

When classes assemble for the study of tomato growing each member is requested to list the local growers and the local marketing period for tomatoes. They visit growers or report from experience the local marketing periods. The list is tabulated in class on the board. This report will show July, August, September and October as possible marketing periods within the area indicated on Map I. The report will show also that a large majority of growers market their tomatoes in August and September.

Question;- 1. Which is the best period to market tomatoes ?

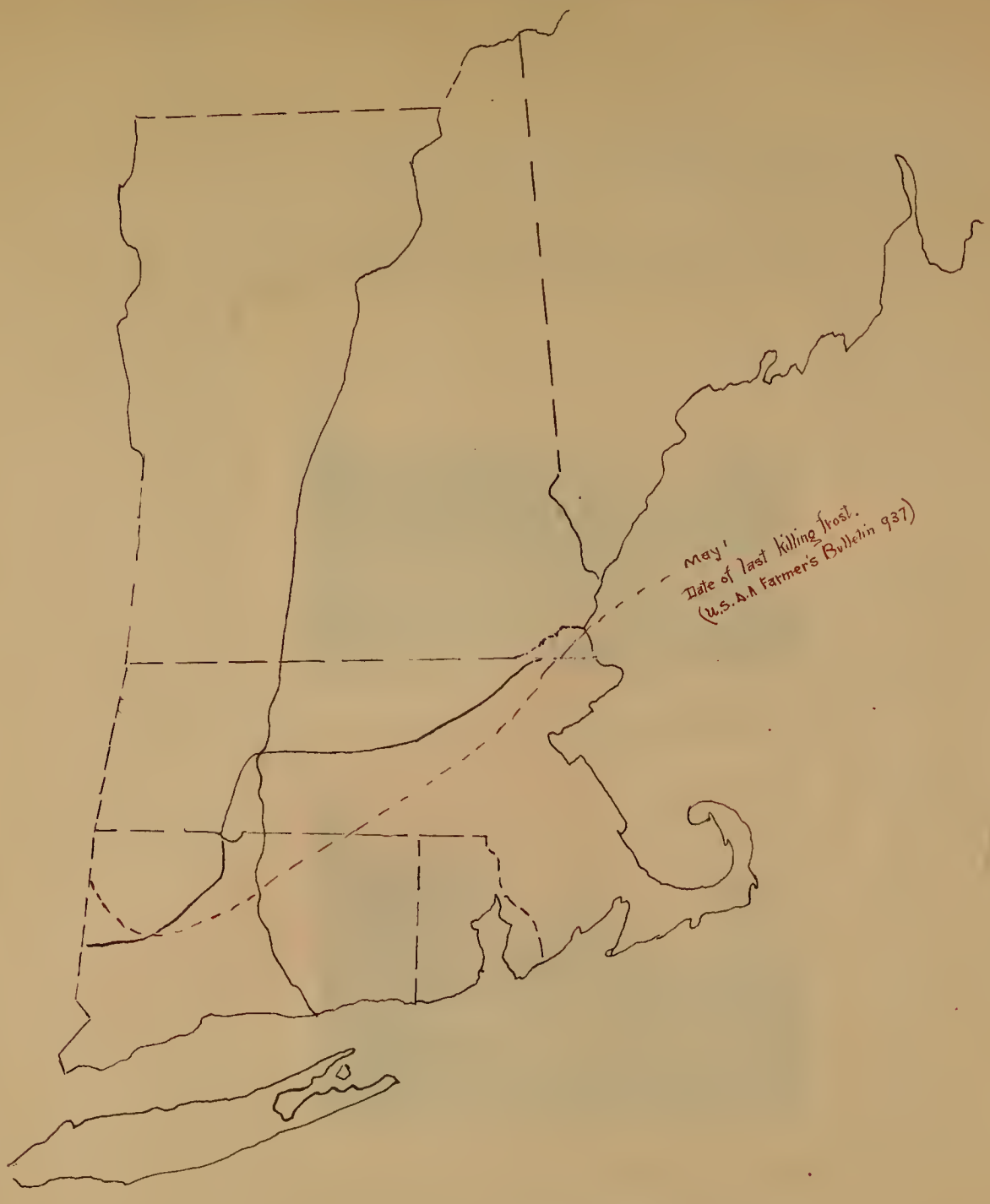
2. When is the dull period locally ?

Plate I shows this period started August 12th in Springfield, 1935 - prices 30¢ per basket.

This leads up to a comparison of early and late tomatoes.

MAP I.

AREA IN NEW ENGLAND ADAPTABLE FOR JULY PRODUCTION.



Improved land (1928)		Sandy loam favorable for early tomatoes.
Connecticut	500,000 A.	120,000 A.
Massachusetts	560,120 A.	140,030 A.
Rhode Island	100,000 A.	20,000 A.
Total	1,160,120 A.	280,030 A.

PLATE I.

ANNUAL AUGUST SURPLUSES OF LOCAL TOMATOES

Tomatoes and other products unsold at the close of the market day, August 12, 1935. Springfield Farmer's Market.

EXERCISE I.

PROBLEM TO SHOW VALUE OF PLANNING PRODUCTION.

Teachers need not restrain interest in tomato production, provided such production is planned to meet scarcity periods. Such production is needed.

Interest is stirred by reporting the favorable prices received in the early season. Then the question of relative income from early and late tomatoes is introduced.

From actual farm records the problem of Exercise I is presented in skeleton form - no answers or descriptions of the two enterprises are given until the pupils have completed net returns.

The relative value of early and late production is seen.

The relative cost of such production is seen. In five years use this problem is 100% effective in arousing interest in planning production to meet high price levels and leaves the pupil asking, "How ?"

EXERCISE I.

FARM RECORD SHOWING RELATIVE RETURNS OF EARLY AND MID SEASON TOMATOES.

To be used as a Farm Arithmetic Problem to create interest in tomato production.

½ acre plots - Season 1934.

July				July			
2-8	12 ba @	$3	50 =				
9-15	16 "	3	00 =				
16-22	25 "	2	75 =				
23-29	36 "	2	00 =	23-29	2 ba @	$2	00 =
August				**August**			
-5	42 "	1	80 =	-5	10 "	2	00 =
6-12	56 "	1	30 =	6-12	25 "	1	30 =
13-19	60 "		58 =	13-19	34 "		60 =
20-26	20 "		25 =	20-26	50 "		30 =
27-31	10 "		20 =	27-31	62 "		25 =
				September			
				3-9	60 "		25 =
				10-16	45 "		20 =
				17-23	40 "		25 =
				24-30	25 "		20 =
	279 baskets		$421 65		353 baskets		$146 40

Expenses			Expenses		
Plants	$25 00		Plants	$18 00	
Fertilizer	18 00		Fertilizer	18 00	
Plowing) Harrowing)	4 00		Plowing) Harrowing)	4 00	
Stakes	15 00		Other labor	60 00	
Training	12 00		Baskets	18 20	
Other labor	55 40				
Baskets	14 00				
		143 40			118 20
Net return		$278 25	Net return		$ 28 20

Farm records teach many related facts in class exercises This problem shows the value of planned production.

EXERCISE II.

THE FACTORS OF EARLY PRODUCTION

Problem:- How to produce early tomatoes in New England. Pupils attempt to determine the factors for themselves. After visiting the farms or from experience they report all possible factors of early production. These are listed on the board. The instructor emphasizes the most important factors locally. One way to do this is to exhibit visual aids, i.e.,

A.- Early stocky plant.

B.- Proper soil condition.

C.- Pruning and training.

D.- Proper use of N. P. and K.

E.- Periodic operations on time.

As they advance in knowledge they learn more factors.

* * * *

The following references are submitted in this exercise for authority on problems in planning and later producing: -

U.S.D.A. Farmer's Bulletin - - - - - - - - -1338
" " " - - - - - - - - -1291
Cornell Experiment Station Bulletin - - - -467
" " " " - - - -580
Massachusetts " " Leaflet - - - - -51
Purdue University Extension " - - - - 182
Watts - Vegetable Growing - - - - -Chapter XXI
Karey Davis - Tomato Culture Hort.Ent." VIII
W.W. Tracy - Tomato Culture - - - - " III to XV
Weaver & Bruner - Root Development

EXERCISE II. - A.

PLATE II. - FACTOR - STOCKY PLANT.

Tomatoe Plant Ready To Be Set In The Field.

Twelve to fifteen inches high, with stocky top, green foliage, fibrous roots, two main stems and two blossom clusters, well developed for early fruit. "Should be set deeply in the soil." Crotch should be near the surface of the soil.

EXERCISE II. - B.

PLATE III. FACTOR - PROPER SOIL CONDITION

At the time of setting both plants were the same size, age and variety, and received the same food supply and care after setting.

A.- Soil was plowed 4 inches deep and the lumpy subsoil was not broken early and allowed to become loose and friable.

B.- Soil was plowed 8 inches deep.

EXERCISE II. - C.

FACTOR - PRUNING AND TRAINING.

Effect on early yield -(Early yield includes the fruit picked during the first eighteen days of the picking season.)

TABLE IV. PRUNING AND TRAINING TOMATOES.

Early marketable fruit - tons per acre.

Treatment	Distance of planting	Average yield 3 yrs.
Pruned, trained	1.5 by 3 ft.	4.00 tons
" "	2 " 3 "	2.81 "
Unpruned, untrained	3 " 4 "	.85 "
" "	4 " 4 "	62 "

The average yield of early fruit per plant was greater from the pruned than from the unpruned.

H.C. Thompson, Cornell Agricultural Exp. Sta.

Workers in other parts of the United States have obtained results similar to these. Magruder in Ohio; Olney in Kentucky; Wicks in Idaho; and Whipple and Schermerhorn in Montana obtained larger yields of early fruit from pruned, trained plants than from unpruned, untrained plants.

EXERCISE II. - D.

PLATE IV. PHOSPHORUS A FACTOR OF EARLY TOMATO PRODUCTION.

Showing need for phosphorus annually.

A B

Both plants of same age, variety, size at setting and food supply.

B.- All factors of early production applied and functioning.

A.- Same treatment in every detail as B except no superphosphate applied in 1935.

EXERCISE II. - E.

PERIODIC OPERATIONS.

MONTHLY SCHEDULE FOLLOWED BY GROWERS OF EARLY TOMATOES IN NEW ENGLAND.

TABLE V.

Month -	September	Oct. - Nov.	February
Jobs	Selecting site (sandy soil) Clearing field Seeding land	Making Compost Storing soil Manuring land Plowing Repairing beds Mulching beds	Sowing seeds (in house) Cutting stakes Preparing beds Managing seedlings.

Month -	March	April	May
Jobs	"Pricking off" Managing beds Managing young plants	Budding Potting Manuring field Plowing	Fertilizing Harrowing Fallowing Setting out

Month -	June	July	August 1-15
Jobs	Staking Cultivating Training Hoeing	Cultivating Pruning Picking Grading Marketing	Marketing (Picking) (Grading)

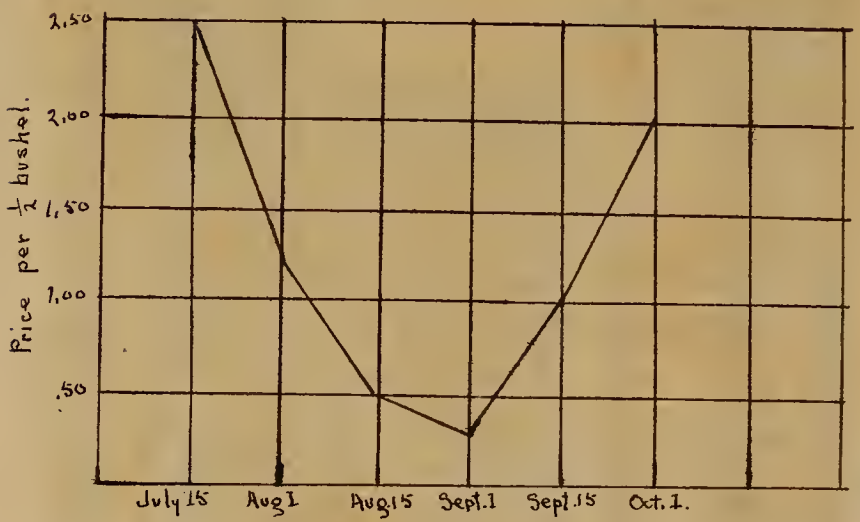
Early production is dependent on performing each operation at the proper time.

Exercise III

Graph II. TOMATO PRICE VARIATION.

To be used as a class problem in Vocational Agritural courses to determine when to produce tomatoes.

Problem:- To explain the price changes as recorded from experience in the market.



Questions:- Explain the causes of price change

A. - From July 15th to August 1st.

B. - " August 1st to August 15th.

C. - " August 15th to September 1st.

D. - " September 1st to September 15th.

E. - " September 15th to October 1st.

EXERCISE III.

TABLE VI. SHOWING PRICE VARIATION IN JULY AND AUGUST.

PROVIDENCE WHOLESALE MARKET PRICES FOR ONE-HALF BOXES OF LOCAL TOMATOES DURING JULY AND AUGUST 1934 - 1935.

July 1934	July 1935	August 1934	August 1935
2-$3.00-3.10		1-$0.75-1.25	1-$0.65-1.25
3- 2.60-3.00		2- 1.10-1.85	2- .65-1.25
5- 2.60-3.00		3- 1.40-2.10	3- 0.00-0.00
6- 1.60-2.20		5- 0.00-0.00	5- .50-1.00
8- 0.00-0.00	8-$1.75-2.00	6- .60-1.00	6- .50-1.00
9- 2.25-2.75	9- 1.75-2.00	7- .35- .85	7- .40- .75
10- 2.35-2.85	10- 0.00-0.00	8- .35- .85	8- .40-1.25
11- 2.35-2.85	11- 1.50-1.60	9- .35- .85	9- .30-1.00
12- 2.35-2.85	12- 1.50-1.60	10- .35- .85	10- 0.00-0.00
13- 2.35-2.85	13- 0.00-0.00	12- 0.00-0.00	12- .20- .85
15- 0.00-0.00	15- 1.50-1.60	13- .35- .85	13- .20- .75
16- 1.50-1.90	16- 1.30-1.60	14- .35- .65	14- .20- .75
17- 1.50-1.90	17- 1.30-1.60	15- .35- .65	15- .20- .75
18- 1.25-1.85	18- 1.50-2.25	16- .35- .65	16- .20- .60
19- 1.35-1.85	19- 1.25-1.75	17- .35- .65	17- 0.00-[illegible].00
20- 1.35-2.00	20- 0.00-0.00	19- 0.00-0.00	19- .25- .70
22- 0.00-0.00	22- 1.25-1.75	20- .40- .70	20- .25- .75
23- 1.10-1.60	23- 1.25-1.75	21- .40- .70	21- .25- .75
24- 1.10-1.60	24- 1.50-2.25	22- .35- .65	22- .25- .65
25- 1.10-1.60	25- 1.50-2.50	23- .35- .65	23- .25- .60
26- 1.35-2.00	26- 1.75-2.50	24- .30- .65	24- 0.00-0.00
27- 1.50-2.00	27- 0.00-0.00	26- 0.00-0.00	26- .20- .50
29- 0.00-0.00	29- 1.05-1.55	27- .30- .65	27- .20- .50
30- .85-1.25	30- .85-1.55	28- .30- .55	28- .20- .50
31- .75-1.25	31- .65-1.25	29- .30- .55	29- .20- .50
		30- .30- .55	30- .20- .50
		31- .30- .60	31- 0.00-0.00

- -

NUMBER OF CARLOTS OF TOMATOES SHIPPED INTO PROVIDENCE MARKET.

1933	July	38 carloads
1934	July	39 "
1935	July	57 "

Showing that "lag" in early production goes hand in hand with increased volume of shipped in produce.

EXERCISE IV.

SOURCES OF LOCAL TOMATO VOLUME.

For "long term planning" pupils should know the local sources.

Problem:- To determine the possibilities for increased volume in the local market.

This problem is derived from the previous Exercise I. which emphasized the need for July production.

1.- Present sources, local and distant.

2.- What area of production is causing the local August surplus ?

3.- What effect will increased acreage have on August volume in Hampden County ?

Bristol " ?

Hartford " ?

EXERCISE IV.

TABLE VII. SOURCES OF SHIPPED IN SUPPLY OF TOMATOES.

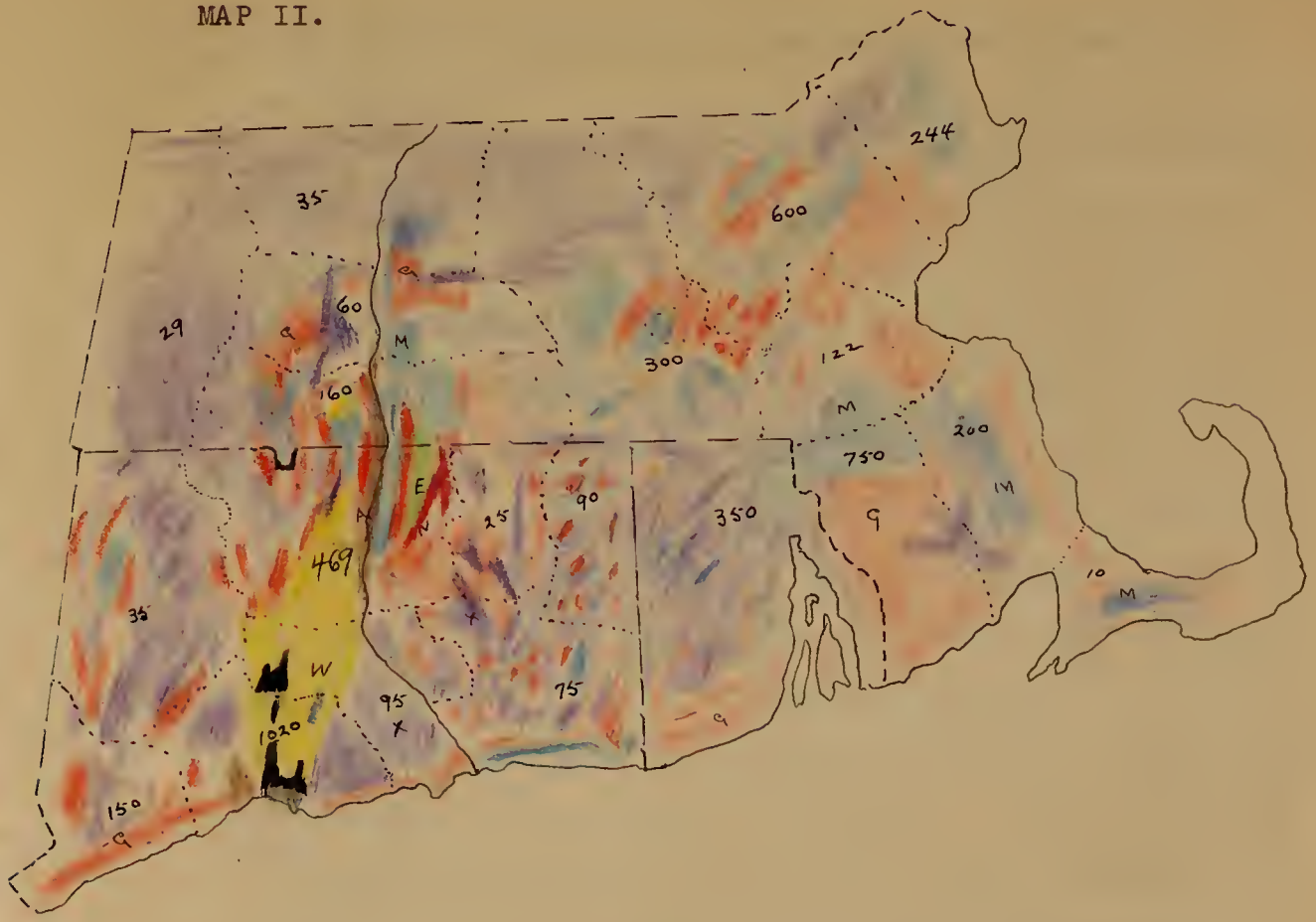
BUREAU OF MARKETS RECEIPTS AND SOURCES - 1934.

To Springfield 1934		June	July	August	September
From					
Florida	carlots	3	0	0	0
Texas	"	47	0	0	0
Tennessee	"	1	14	0	0
Maryland	"	0	2	0	0
New Jersey	"	0	1	0	0
New Jersey	truck	0	5	0	0

Showing no receipts of shipped in tomatoes in August and September, when surpluses are most serious.

SOURCES OF LOCAL GROWN TOMATOES AND ACREAGE BY COUNTIES.

MAP II.



M - Merrimac sandy loam

G - Gloucester fine sand loam

E - Enfield very fine sand loam

N - Manchester sandy loam

W - Wethersfield loam

A - Podunk silt loam

X - Miscellaneous stony soil

H - Hartford sandy loam

U - Unadapted to tomatoes

Types of soil - as indicated by U.S. Soil Survey (County).

TECHNICAL FACTS ON EARLY PRODUCTION OF TOMATOES.

"Early tomatoes may readily be grown by the practical grower who first decides what to do and then does it. Success can be expected by the grower who is a keen observer and who carefully plans his operations in advance, attends to details and executes them on time."[9]

Carefully planning his operation in advance includes preparing the soil either a year or two years in advance of using it for tomatoes. "The keen observer is one who profits by past experiences, a man who upon entering the plant house is able to ascertain at the first glance of the plants whether or not they are growing normally and can recognize any trouble if present. He is the grower who upon examination of the plants in the field can tell whether or not the plants are growing properly and also note the first appearance of insects or disease."[9]

Attending to details refers to the growers who will take time and pains to obtain high grade seeds, select clean soil or sterilize and treat the seed against transmittal organisms, maintain proper temperatures and moisture conditions, transplant at the proper stages of growth and give attention to proper spacing. Briefly he must understand all the conditions which influence the growth of tomato plants and the development of fruit.

Teachers of tomato production need to analyze all factors of tomato production, which requires a constant

review of new information recognized by authority.

"In the native home of the tomato, South America, the soil in composition and structure, the moisture in the soil and in the air, and the temperature and sunlight throughout the growing season are favorable to rapid growth. These conditions are uniform and constant and a plant developed which, while vigorous, tenacious of life, capable of rapid growth and enormously productive, is not hardy in the sense of ability to endure adverse conditions either in character of soil of water supply, or of temperature. A check in the development because of unfavorable conditions is never fully overcome."[16] Damage to the top, wilting in transplanting and root breakage are checks. Drying from improper exposure will emasculate the blossoms and hinder the setting of early fruit. "The key to the most successful culture of the tomato is the securing from start to finish of an unchecked uniform growth, though it need not necessarily be a rapid one."[16]

Under favorable conditions fruit will develop in eighty to one hundred days from seed, according to the variety. This is with full sunshine and constant temperature from 75° to 90°F. in the day and not more than 20° drop at night. In New England, hothouses and cold frames are used for starting and holding plants until outdoor conditions are favorable. The inside

temperature and moisture conditions must be restricted below the conditions expected outside. For early production Connecticut State College, discourages the practice of hardening tomato plants before setting out. This reverts to the fact that the tomato is slow to recover from abuse.

Tomato roots while abundant in number are short and can only gather food and water from a limited soil area. This fact makes the composition of the soil, as to the proportion of directly available food elements, of great importance. Tomato roots are exceedingly tender and incapable of penetrating a hard, compact soil, so that the tilth is of greater importance with tomatoes than with many other crops. The period of active life of the tomato root is short. After transmitting water and nutritive fluids they become clogged to such an extent that starvation and death of the plant results unless new roots are allowed to develop on lateral stems in contact with soil.

"Tomato stems show but little fibrous structure, simply a mass of coarse cellular matter, which while capable when young of freely transmitting nutrition after fifty to sixty days of fruiting become clogged and inert."(16) This not only makes the active life of the stems and leaves short like that of the root but necessitates a fresh growth in order to continue

fruitfulness. This accounts for the longer life of the untrained plants, which spread over the ground taking new root and developing new top growth.

The blossoms of the tomato are "perfect flowered." Inflorescense is abundant but warm sunlight is essential for maturing the pollen to the condition of easily reaching the stigma.

Abundant and unobstructed sunlight is the most essential condition for the healthy growth of the tomato. The entire plant needs sunlight. At no time is there greater need than when the plants are young. If they fail to receive it subsequent favorable conditions will not produce full recovery in time for July maturity. "It is not so much for the want of room for the roots as of light for the leaves that makes plants which have been crowded in beds so weak."(16)

Over supply of moisture is more harmful than undersupply when plants are young. Drainage at the roots is necessary. "An abundance of moisture is needed in the plant at the time the fruit swells and ripens. Fertile sand or a sandy loam overlying a well drained subsoil is best for early maturity."(16) Where early maturity is the main object, the exposure of the field is important. The field should have the full benefit of the sun east, south and west.

In plant food the tomato is not a gross feeder nor

is the crop an exhaustive one but the plant is very particular as to its food supply. It is essential that the food elements be in the right proportion and readily available. If there is a deficiency of a single element there will be no early production. Sandy soils require a higher proportion of potash than the heavier soils, and all early production of fruit requires the presence of a fresh supply of phosphorus annually. "Phosphorus stimulates a rapid growth of the plant early in the season producing more blossom clusters and causing more early fruit to set. Available nitrogen must be present up to the time of the fourth cluster formation."[11] Tomato roots have little power to wrest plant food from the soil. Preparing the soil:- "New rich conditions should be avoided."[16] A medium acid soil pH 5-6 which is rich because of judicious manuring and careful cropping for several years previous is best. Care should be taken in the selection of crops preceeding tomatoes. Tomatoes are not grown by experienced growers on the same land more often than once in three or four years. "Plants must not be set in packed or lumpy soil, always and everywhere the soil should be made fine, friable and uniform in condition and to the greatest depth possible as the character of the subsoil will permit."[16] (Plate I.) The heavier soils must be kept loosened, while the sandy soils should be slightly packed after deep plowing. Several weeks of bare fallow is strongly recommended.

The management of the soil and of the plants are both under the control of the grower. He must know his soil and know the plant and know how to bring these together in proper relation for early production.

Early maturity requires special planning and care in starting and developing a special type of plant. The aim is to secure, by the time they can be set out, plants which have come by an unchecked rate of growth to the proper size consistent with transplanting to the field with the least check. There are several methods by which this is accomplished, but the rule of no forcing, no crowding and no severe hardening is common to all. Plants should be kept green and stocky and the roots abundant and fibrous. All methods involving late sowing of seeds and forcing or sowing broadcast and pulling the plants for field setting are not consistent with early production of fruit.

In setting out, the plants should be watered without damage to the blossom clusters and heavy applications of Bordeaux mixture should be avoided, as this covering retards the growth. Set the plants so that the first leaves just clear the ground. Staked plants promote early maturity. The cultivating may be deep and close to the plant at first, but it should be shallow and away from the plant later. The proper use of Bordeaux mixture for control of the flea beetle, early blight and late blight must be known.

FACTORS OF PLANNED PRODUCTION OF TOMATOES.

Available resources in climate and soil to carry out a plan.

Possession of technical knowledge and skill of tomato culture.

Information available on annual periods of scarcity and of surpluses.

knowing the periodic operations in tomato production.

Knowing the proper use of N. P. and K.

Experience in growing tomatoes on a variety of soils.

Preventing diseases and insect infestations.

Efficient marketing.

FACTORS OF EARLY PRODUCTION OF TOMATOES.

A fertile, well drained sandy soil. Sufficient acreage for rotation.

Recognizing the special requirements for early production in contrast to the requirements for ordinary production.

Facilities for starting early plants.

Sturdy plants.

Proper soil preparation.

Possession of technical knowledge and skill of early production.

Proper heat, moisture and sunlight.

Proper use of N. P. and K. on "light" soil.

Proper pruning and training.

Proper cultivation.

RESULTS IN TEACHING PLANNED PRODUCTION.

CASE I.- A vocational agricultural pupil in 1933, planned a project of one acre of early tomatoes to meet the July demand in the Springfield market. He had grown tomatoes before but he was slow to realize the extreme importance of carrying out the details of his plan. He selected sandy soil, Bonny Best variety, manured and plowed his land and set out the plants hurriedly. The plants had not been potted and they encountered a severe check. No fruit ripened until August 10th and the untrained vines continued to produce late growth and late fruit. Tomatoes brought 50¢ to 20¢ per half bushel and the return for 210 baskets amounted to $62.00. No planned production here.

In 1934, more attention was given by this boy to preparing the land in advance. 1,000 pounds of acid phosphate was harrowed in. The plants were started earlier, more carefully developed and the same variety as the previous year. The tomatoes began to ripen July 20th but a period of cool weather reduced and delayed the volume of fruit; yet a return of $172.00 was realized as a result of selling the early pickings at $1.00 per half bushel. By a supervised comparison of results the importance of planned production was realized and this pupil immediately began planning for

1935 by building a small greenhouse and preparing his land in advance.

In 1935 he raised two acres, recognizing the factors of early production of tomatoes and began picking July 15th. He received $2.00 to $1.00 per half bushel and a return of $316.00 per acre. The expense was the same as in previous years except an item of approximately $25.00 in constructing a sash greenhouse of secondhand material, and for heating the same. In this case three years were necessary to realize effective early production.

CASE II.- Another vocational agricultural pupil with experience in growing tomatoes on a small home farm selected a project of one-third acre of tomatoes. The land on this place was sandy and the crops raised consisted of berries and vegetables. (This boy's father was employed in a nearby city yet about five acres were cultivated as a family enterprise.) The perennial crops were profitable because of favorable soil for early maturity but tomatoes had long been unprofitable because early varieties and early cultural methods were not used. This small tomato project was planned very carefully and every factor of early maturity was reviewed and given attention. Tomatoes ripened the middle of July and yielded ninty half bushels, which sold at prices averaging $1.00 per basket. In

addition a total of 25 baskets were used by the home for canning, etc. Ninty dollars greatly exceeded any previous return for a similar acreage and was the result of higher prices received for early tomatoes. An increased volume was noted as a result of more efficient use of fertilizer, especially phosphorus. The results were appraised by the father to a greater extent than by the boy.

The following year the father lost his position and gave full time to farming. He built a greenhouse, raised and sold vegetable plants and specialized in early tomato plants. In 1935 six experienced tomato growers who used his plants began picking tomatoes the middle of July on a variety of soils. The man himself raised one half acre following his son's example in culture, and began picking July 12th, when prices were $2.50 per basket, receiving $240.00 from the half acre. In addition he secured his usual supply for home use. Pritchard variety was used. (See photo).

PLATE V.

EARLY TOMATOES PLANNED

Father carries out pupil's project.

Photo taken July 25th, 1935. First picking July 12th.

Factors of early production here.

Sandy loam, properly developed. Early potted plants pruned, trained and proper use of N.P. and K.

EVALUATION OF TECHNICAL AND ECONOMIC DATA.

Several methods of producing early tomatoes have been given. The principal variation is in the methods of starting the plants. Some authorities advocate sowing seed March 15th with subsequent forcing of the plants; others advocate sowing seed February 15th with a comparatively slow development. Few concrete comparisons of these two methods for July volume in a specific season are available. Information on this point has an important bearing on costs of production, and it is greatly needed.

Early in this study it became evident to the writer that several thousand acres of fertile sandy loam formerly used for tobacco in the Connecticut Valley region were available and most suitable for early tomatoes. Recent tariff changes on cigar wrapper tobacco have changed the situation. Sandy soils are preferable for binder tobacco and increased utilization of these soils for that purpose may be expected.

There is no economic formula for determining the degree to which prices will be reduced by increased July volume. "Prices vary indirectly with supply." (Graph I.) Soil surveys show a liberal proportion of sandy loams not utilized for tomatoes. Low volume and high prices for local tomatoes in July for five years

have been shown, which warrant the recommendation of a wider utilization of sandy loams with early varieties for July production.

The many factors of early production of tomatoes have been given for a comparison of their importance. Teaching material must be reviewed often and revised to keep abreast with changing markets and improved cultural methods.

SUMMARY AND CONCLUSION.

The attempt has been made to show that planned production of tomatoes involves adjusting individual production to consumptive needs. Successful tomato growers have demonstrated this. The facts on such production have been presented in several ways as they may be used in teaching beginners, to promote interest and "readiness" in following the example of successful producers. Contact with such cases affords a means of acquiring the knowledge and skill needed for planned production.

The market data presented show a need for local tomatoes in July. Market conditions may change in the future and the dates of annual scarcity may change but a productive program adjusted to market needs will conform to market changes.

Some growers possess "heavy" late land only. The utilization of a higher proportion of "light" land for early tomatoes where it is available locally will promote a twofold benefit. Growers who produce early will profit by higher prices, and they will reduce volume in the late season to the advantage of those who must produce late tomatoes. The resulting uniform supply at uniform prices will be favorable to local producers as well as to consumers. The lower July prices will tend to reduce the volume from outside areas.

Wholesale prices for New Jersey and Maryland tomatoes at present quotations are one-half the prices of local fruit and only 50% of the shipped-in tomatoes reach the consumer in a sound condition. "Goods of a high degree of perishability tend to be produced adjacent to markets." (Van Thuenen's Law.) Increasing the local volume tends to discourage shipments from outside areas.

Teachers of vocational agriculture give individual instruction and the planned production suggested applies especially to individuals. The cases presented for teaching are to arouse interest, readiness and competitive effort in learning planned production. The exercises are "repeated use of mental connections"[12] to promote continued interest and readiness to acquire and apply the factors of planned production as the pupil continues to participate in practice. No set method for use of material can be advanced that will be effective in all cases. The use of pictures is known. Maps, charts, and tables are useful for the facts and comparisons which they effectively show. Their use is restricted to a search for facts. All the data presented have been used in teaching and have promoted a continued search for more facts on market conditions and the technical knowledge and skill to meet the existing market conditions.

The supporting cases are average cases showing

that three years of practice is the average time for beginners to realize effectively planned production of tomatoes. Meanwhile if parents indirectly acquire and apply the facts the teaching is more effective.

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